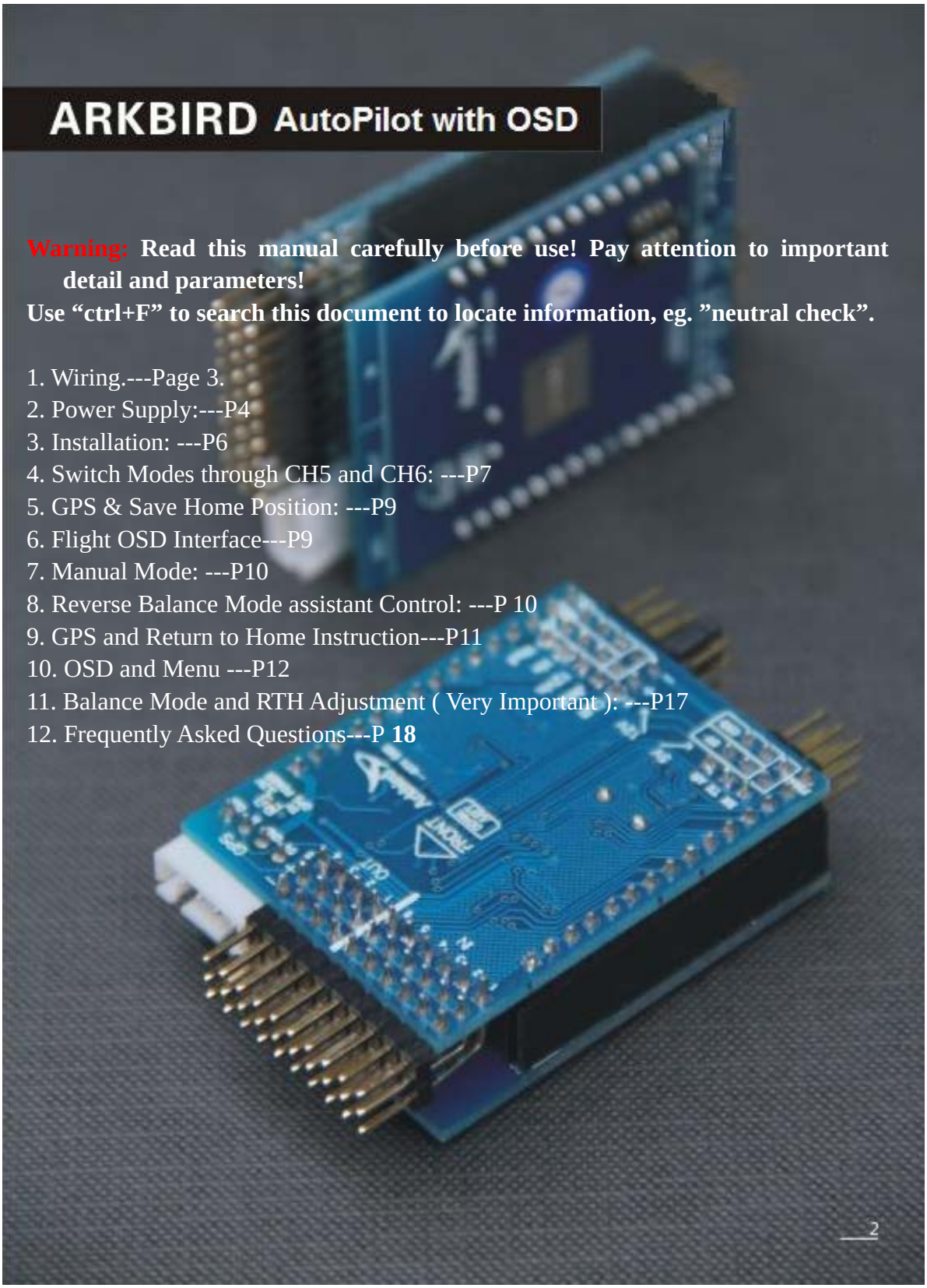
Product Features:

ARKBIRD System is a high-accuracy autopilot designed for fixed-wing:

1. Function all in one broad, on broad IMU (Inertial measurement unit), OSD (On Screen Display), barometer Attitude sensor, 12V-5V regulation chip, “ESC + voltage regulation” dual power supply. Industrial reliable design.
2. Plug & Play design, no need to weld any wire, Adjust parameters by OSD menu and radio stick.
3. Intelligent PID controller. Easy to adjust, support delta-wing.
4. One button auto-leveling, one button RTH (return-to-home), lost radio signal return-home.
5. Cruise flight (Keep straight &constant-height flight).
6. Gyro normal balance and 3D balance. Hover mode.
7. Fence mode（Auto Switching to Return-to-Home Mode while flying out of the rectangle area specified.）
8. 4 Way point flight, coordinate set by radio stick.

One board OSD features:

1. 2 Voltage display, 3D Go-home arrow, radar mark, flight time, horizon, total distance, and power consumption.
2. Customized interface: can set Fighter HUD interface, can choose the font size, the demands of latitude and longitude.



Warning: Read this manual carefully before use! Pay attention to important detail and parameters!

Use "ctrl+F" to search this document to locate information, eg. "neutral check".

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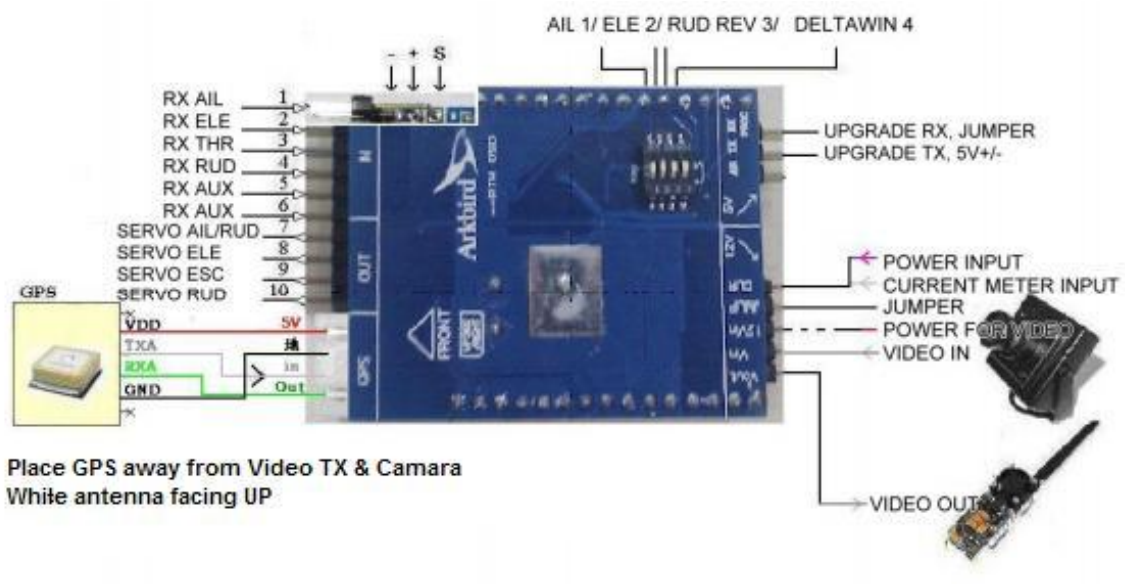
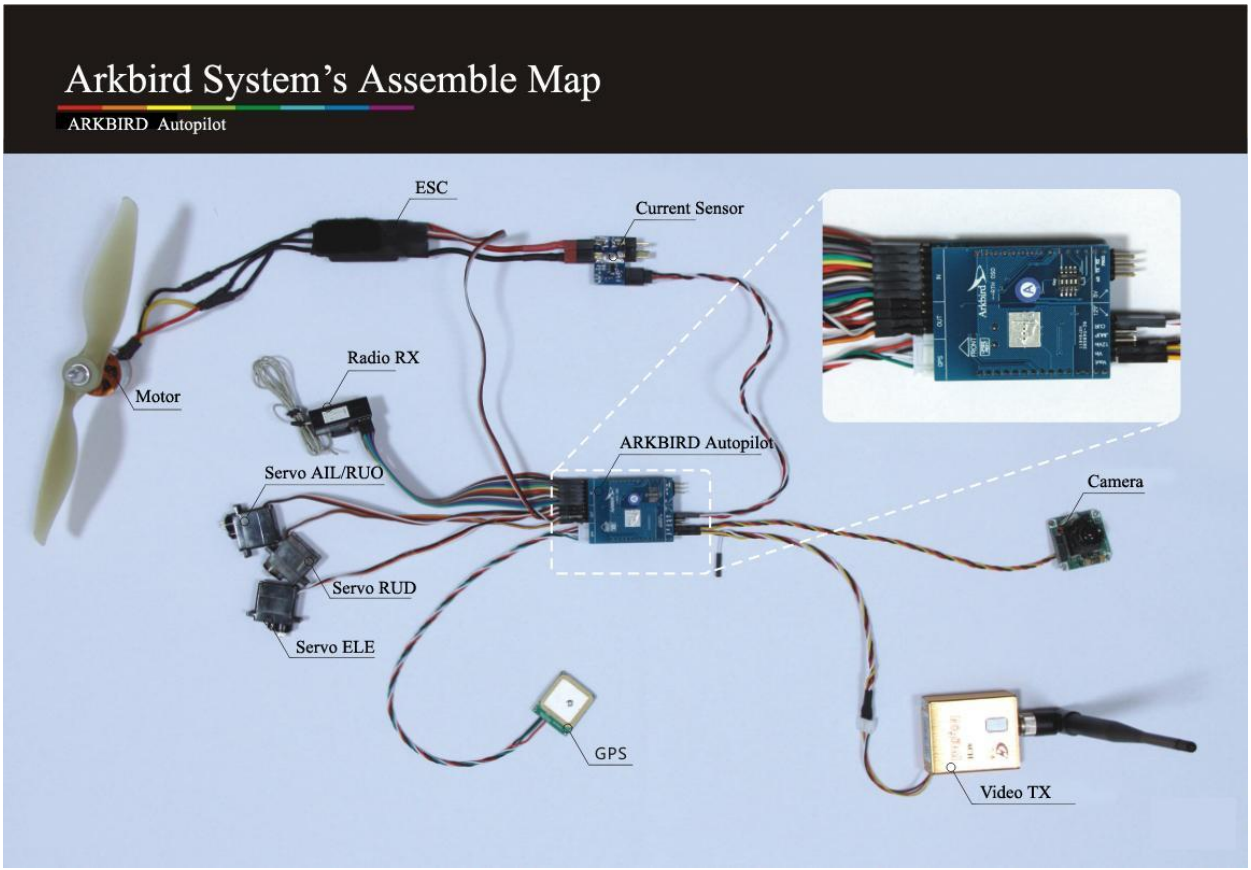
1. Wiring



Use 3P wires "black (ground), red (power), white (data)"

（Note the polar of camera wire, DO NOT POWER ON before carefully check.

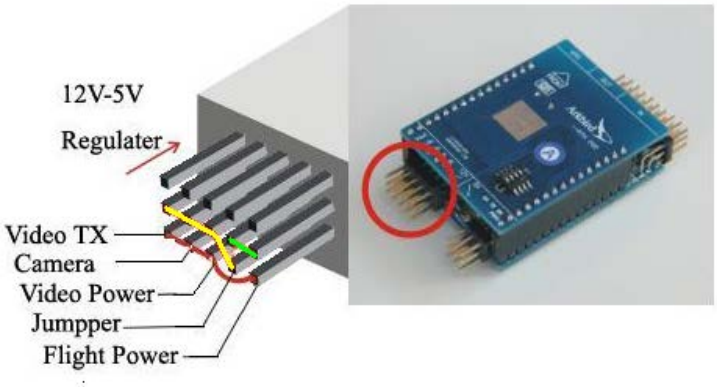
Especially 12V, incorrect wiring will damage the autopilot permanently!）



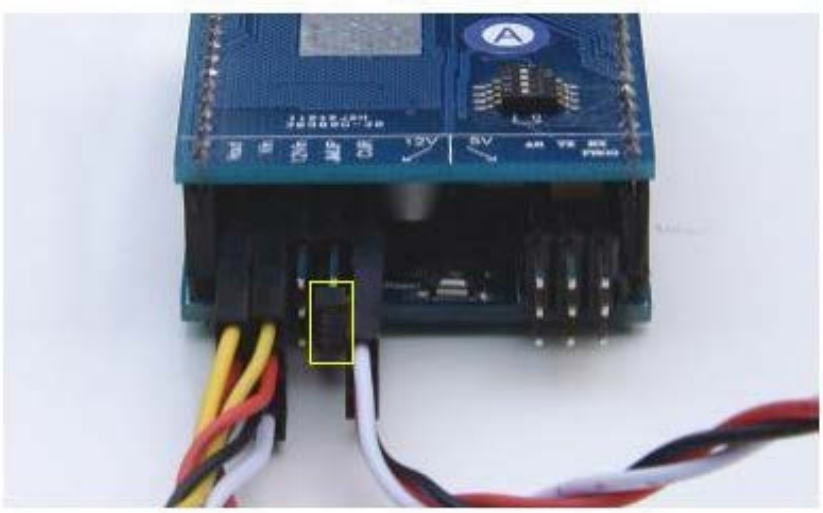
2. Power Supply

Recommend using one single 3S (12V) battery to supply flight power and Arkbird OSD12V, Video TX & camera (Shared supply),

Otherwise, use one battery (2S-6S) to supply flight power, another 3S battery to supply OSD 12V&Video (Separated supply).



Power Supply Diagram

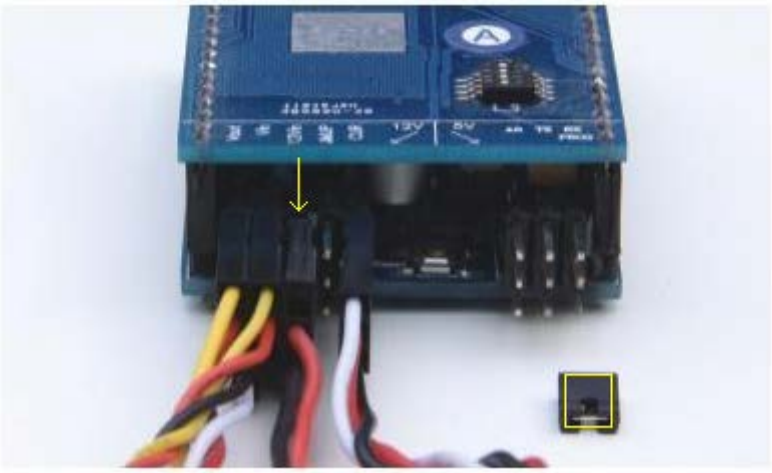


Arkbird sensor's 3P wire can wire in the flight power.

1. If 3S battery, plug in the jumper (Default), it will supply power to 12V Video system (Arkbird OSD 12V, Video TX & camera).

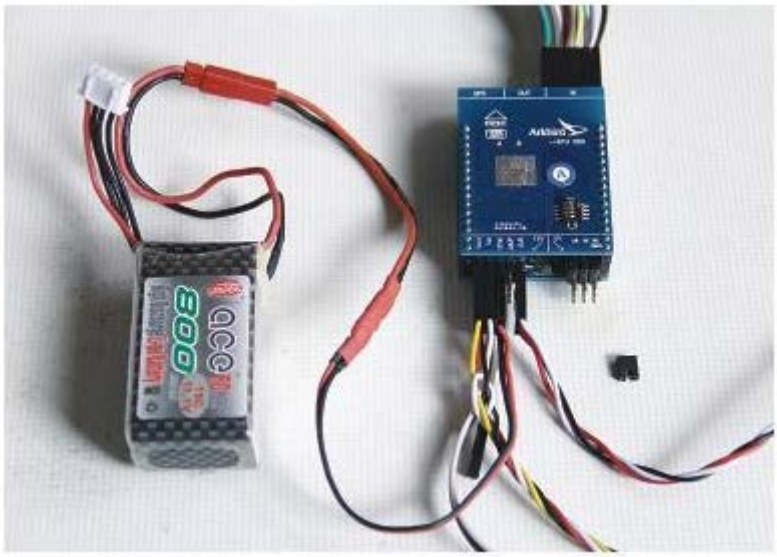
OSD12V - 5V regulator provides additional 5V power for OSD & CPU.

If not using OSD, we also strongly suggest plug in OSD 12V to provide dual power to prevent any issue caused by ESC 5V power insufficiency.



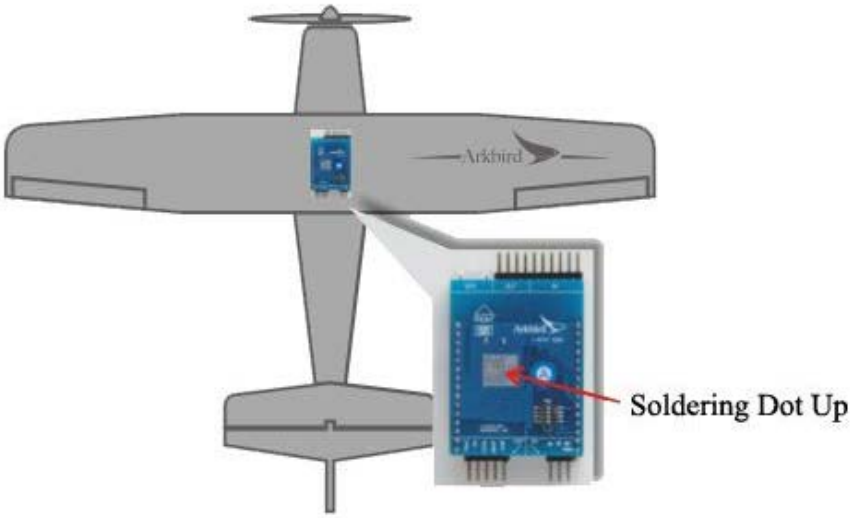
2. If separated supply, remove the jumper, connect another 3S battery (800mah-1000mah) to the Video Power Port (12Vin) on the third row.

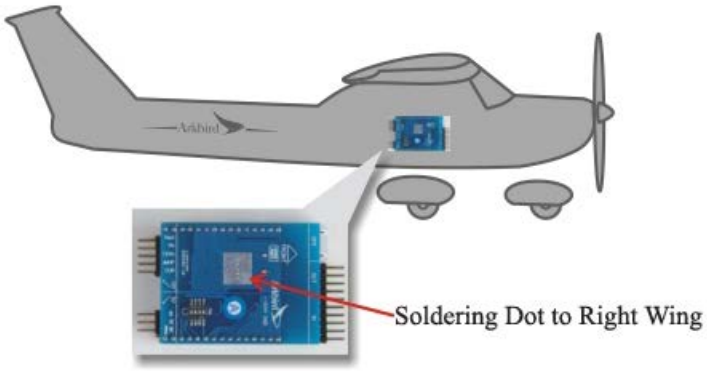
If separated supply, the **sequence to power on** is OSD 12V first, and then ESC flight power. Otherwise, the OSD cannot initialize and display.



3. Installation:

1. **The pins of Servo & Radio RX** shall stay forward (toward flying direction), the side with soldering dot shall be upward or Vertical toward right wing. （Default is level installation）
2. Put on heat-shrink tubing, fix by sponge and cable tie. Please keep away from motor to avoid vibration which will reduce the accuracy of sensor.
3. While using on flying wing, connect channel 1 output to right servo and connect channel 2 output to left servo. DISABLE the mix function from transmitter, switch Dip switch 4 to “0” to enable flying wing mix.
4. While using on 3-channel plane, connect channel 1 output to rudder to steering.
5. When setting return-to-home, please take off propellers for safety concern.





2 ways of installation

4. Switch Modes through CH5 and CH6:

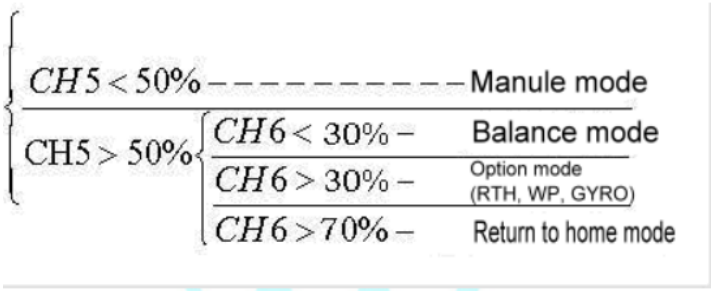
1. After installation, test OSD and the radio control. Use CH5 and CH6 (0% to 100%) to switch flight mode.

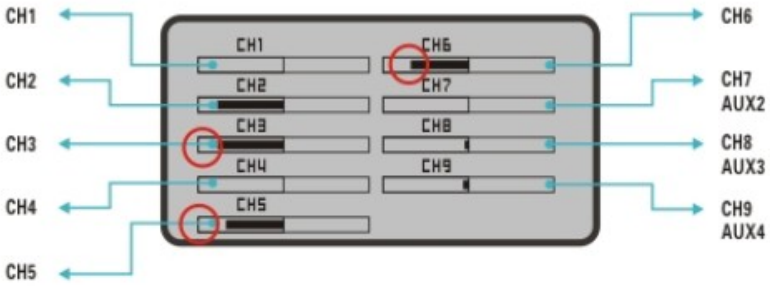
2. While CH5 < 50%, it switches to Manual Mode（OSD shows ），

3. While CH5 > 50% and CH6 < 30%, it switches to Balance Mode（shows ）；

While CH5 > 50% and 30% < CH6 < 70%, it switches to Custom Mode（Way point Mode or Fence Mode），

While CH5 > 50% and CH6> 70%, it switches to Return-to-home Mode.（shows ）.





（Pos and Negative）

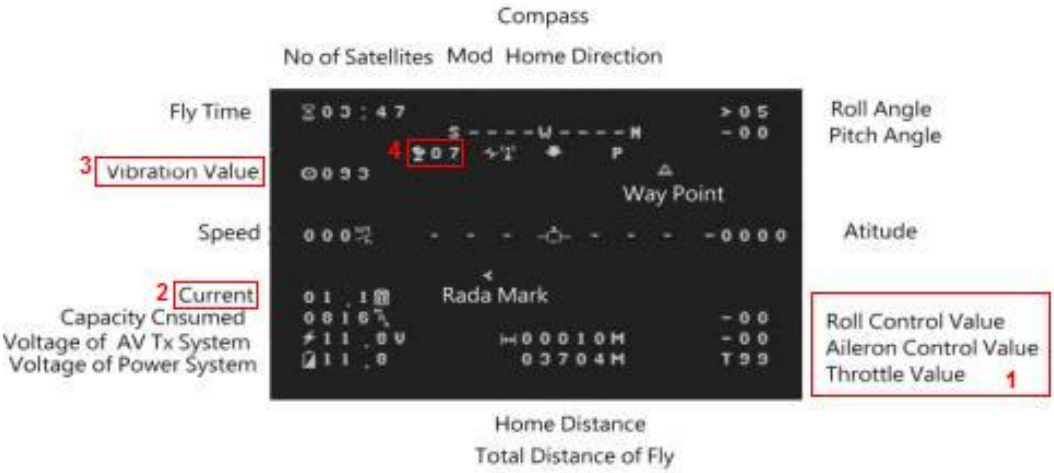
5. GPS & Save Home Position

After power on, Arkbird will start to search GPS satellite and save the first valid position as Home.

During searching, the elevator will be up and any manipulation of radio stick is invalid. If need to skip the searching, please push CH6 more than 75% and push CH1 to left or right side for 1 second.

Once skipped the searching, it CANNOT switch to RTH mode, RTH logo will flash but it is balance mode.

6. Flight OSD Interface



1. **When Arkbird is auto piloting the plane**(RTH mode、Cruise flight), t**he lower right will display Roll, Pitch control Angle Value and Throttle Value**, Adjust Autopilot if these angles not appropriate.

2. The idle current is 0.8A while turning off the throttle, if the readout is wrong, please enter the OSD menu and exit to reset the current value.

3. Please reduce the motor vibration to keep the “vibration value” more than 65 (100 is the most ideal situation).

4. Pay attention to GPS satellite quantity, less than 7 will result mistake positioning.

7. Manual Mode

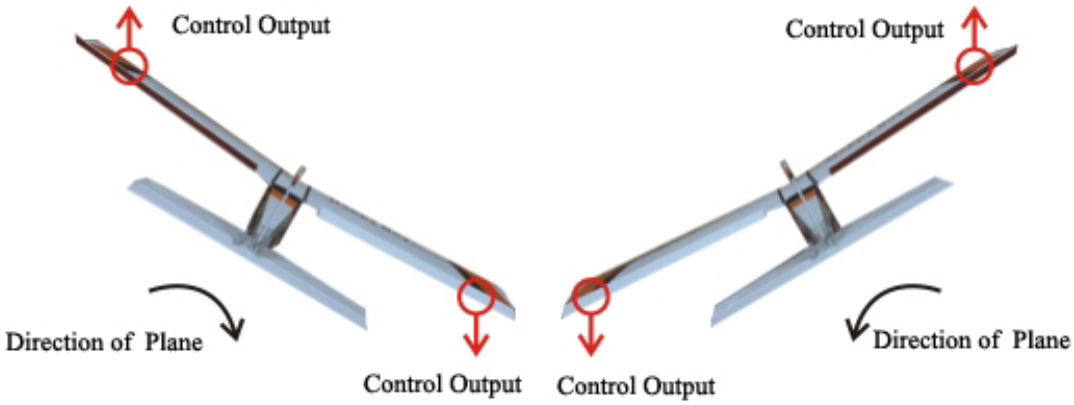
Radio Stick and SUB-TRIM back to center, set radio travel range as 100%.

Switching to Manual Mode , Arkbird will not participate control, set manual control's reverse through radio, adjust plane's CG and travel angle, make sure plane can fly stably in horizontal without Autopilot.

8. Reverse Balance Mode assistant Control

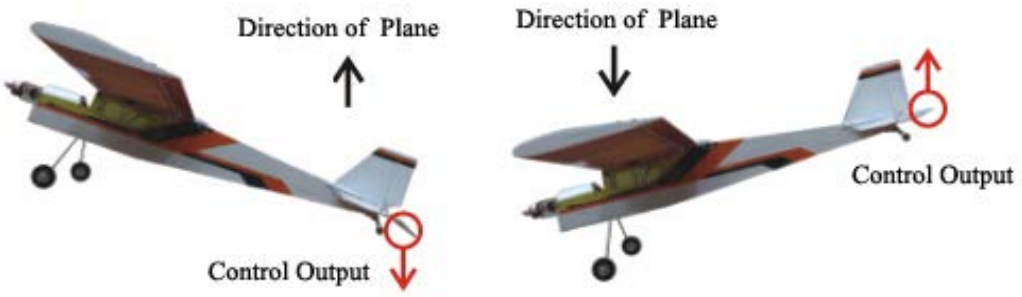
Switching to Balance Mode by pushing CH5 to 100% and CH6 to 0%, if the neutral point is correct, rudder, aileron and elevator shall be at the neutral position, otherwise, please check the neutral point again.(see OSD menu -> CTL parameters)

1. **Aileron**: When rolling the plane to right, aileron shall produce a left compensation automatically, make plane go back horizontal. On the contrary, when rolling to left, aileron will produce a right compensation. Please see as below:



If the compensation direction is not correct, please move the Dip switch 1 to the other side.

2. **Elevator**:When pitching up the plane, elevator shall produce a down compensation automatically. On the contrary, when pitching down, elevator will produce an up compensation. Please see as below:



If the compensation direction is not correct, please move the Dip switch 2 to the other side.

3. **Rudder**: When yawing the plane to right, rudder shall produce a left compensation automatically. On the contrary, when yawing to left, rudder will produce a right compensation.

If the compensation direction is not correct, please move the Dip switch 3 to the other side.

9. GPS and Return to Home Instruction

While switching to **RTH Mode** (CH5 to 100% and CH6 to 100%), it will adjust the flying height to safe height to go home.

If the throttle safe is open and when height and distance is within 30m, ESC will alert by a sound of "didi", but no any throttle output, to avoid any hacking while adjusting. (Refer to OSD menu）

During RTH mode throttle will increase if altitude is low, or speed is slow, decrease if altitude is high, or speed is faster than set safe speed.

Once lost GPS satellite, switching to RTH, the plane will go home automatically based on the home angle of last position before out of signal. Within radio range, please switch to Balance Mode and land.

Please keep an eye on the quantity of GPS signal and voltage value, fly carefully. Please note if the quantity of satellite is less than 7, the positioning might not be correct.

Set Fail-Safe to RTH mode:

Fail-Safe is a receiver's function to preset position when receiver is out of signal. Some receivers can set in the radio menu, and some save the current position through receiver (probably through a button).

Please refer to the manual of receiver. Set the fail-safe position the same as Return-to-Home Mode through CH5 and CH6 (CH5>50%,CH6 > 70%). And then turn off the radio to check if it switches to Return-to-Home Mode.

（Note: No need to set fail-safe from channel 1 to channel 4 as these four channels are controlled by autopilot under Return-to-Home Mode, which is not relevant to receiver.）

10. OSD and Menu

CH5 switches to Manual Mode(<50%), throttle to 0%, and push CH1 to left or right side for 6 seconds, it will enter into main menu. Exit the main menu if CH5 switches to auto mode(>50%).

Moving stick up and down to change the value, pushing to right side to select, and pushing to left side to exit and save parameters.

Main Menu

Main Menu:

"Set HOME" --------- Save home position
"Set CTL Parameters" --------- Set CTL Parameters
"Set RTH Parameters" --------- Set RTH (Return to Home) Parameters
"Set OSD Parameters" --------- Set OSD Interface
"----------"
"Flight Parameters" --------- Reverse and delta-wing mixing
"Fence Area Set" --------- Set Fence Mode Area
"Way Point Set1" --------- Set Way Point Mode1
"Way Point Set2" --------- Set Way Point Mode2
"Reset All to Default" --------- Move stick to right side for 2 seconds to reset to default

Set CTL Parameters

"Roll Ctl " ---------Roll Control（%）(equivalent to travel range on radio, Please adjust the travel range on OSD, do not adjust through radio）
"Pitch Ctl " ---------Pitch Control（%）
"Yaw Ctl " --------Yaw Control（%）
"----------"
"Neutral Check" ---------Neutral Point Check:

Neutral point alignment needed under first installation, not used for weeks, or temperature variation is more than 10 degrees.

Aileron all the way to the right means it is waiting autopilot be put down, OSD shows "Waiting Neutral Point Check."

Put the autopilot paralleled to the ground (Please prop up if there is a landing gear), and move CH1 left and right to do 3-seconds neutral point check. Aileron will be back to center once finished.

Note: Pushing CH5 and CH6 to minus (0%) and moving CH1 stick to left or right side within 3 seconds after power on can also enter neutral point check.

"----------"
" Custom Mode" ---------Custom Mode（CH5> 50% and 30% < CH6 < 70%）:
"RTH": Return to Home（Default）
"Way Point": Way Point Mode, it is able to trace the Way Point Set by WayPoint menu.
"HOVER":Hover mode, regard the hover position as balance position
"Gyro":Gyro Mode, it will do compensation for unintentional attitude changes.

"Attitude Source" ---------Attitude Source:
"GPS":Attitude acquisition through GPS
"AR PRESS":Attitude acquisition through barometer(recommend)

"Lock Dir/Heig" ---------Lock direction and height (Cruise flight):

"ON":Under balance mode, when CH1 and CH2 stick back to center, height and direction will be locked and keep straight & constant-height flight.

OSD shows . Aileron and elevator can also be controlled through CH1 and CH2.

"OFF": Turn off the mode.

Set RTH Parameters

"Max Roll" ---------Max roll angle while return to home, 20 to 40 degree recommended.

"Max UP" --------- Max pitch (up) angle while return to home, 20 to 40 degree recommended.

"Max Down" --------- Max pitch (down) angle while return to home, 20 to 35 degree recommended

"Elevate Angle" --------- Level flight's elevate angle, 3 to 15 degree recommended. Please adjust this value while pitch up or down to have level flight even the stick is back to center.

"----------"

"RTH Throttle" ---------Return to home throttle（%）

"AUTO Throttle" ---------The autopilot will use the throttle value of level flight automatically as return to home throttle. (Default)

"----------"

"Safe Speed" --------- Minimum speed of return to home（when speed is less than the certain value, it will accelerate throttle in proportion to avoid lost while being upwind.）

"Safe Height" ---------Safe Height（The minimum height of return to home, 80 to 200 m recommended.）

"Throttle Safe" ---------Throttle Safe（When distance and height are less than 30m, for safety concern, there is no throttle output under RTH Mode.）

Set OSD Parameters

"Big Letters" ---------Size of the characters selection

"Show Lat-long" ---------Show longitude and altitude

"AD Calibrate" ---------Battery voltage calibration

"OSD Pattern" ---------OSD interface selection

（Simple:Show home angle and voltage only）

（Default:Normal interface）

（Fighter:HUD interface）

（ALL Info:Show all attitude information）

"P or N(Xin)" --------- PAL/ NTSC selection

Flight Parameters

Note: Adjusting these four parameters is equivalent to adjusting the Dip switch.

"Roll (KEY1)" ---------Roll Reverse

"Pitch (KEY2)" ---------Pitch Reverse

"Yaw (KEY3)" ---------Yaw Reverse

"FlyWing (KEY4)" ---------Conventional/ Delta Wing

Fence Area Set

Switching to CH5 > 50% and 30 %< CH6< 70%, within rectangle area and above safe height it is Balance Mode, otherwise it switches to RTH mode.

"Fence Mode" ---------Fence Mode , "ON" or "OFF"

"----------"

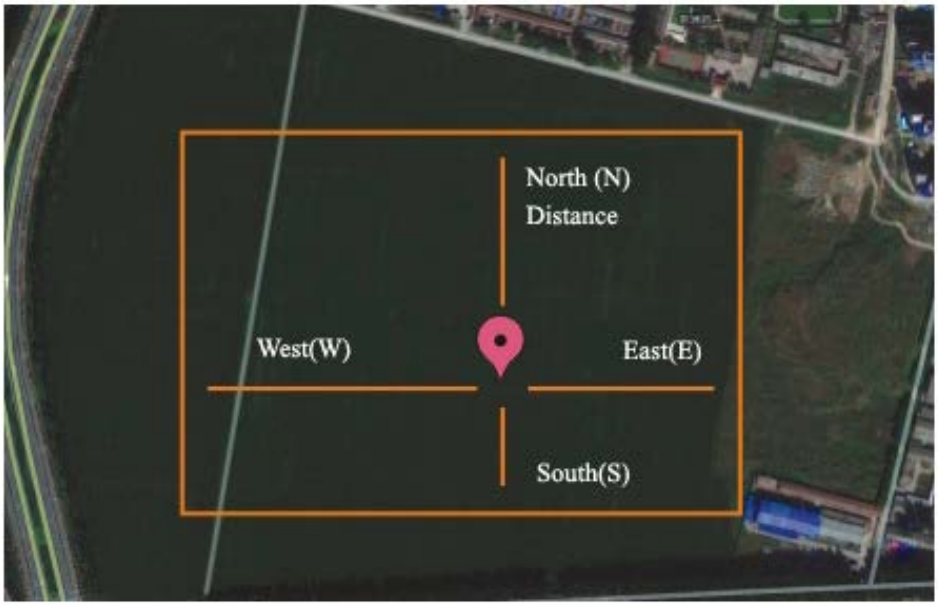
"North Dist" ---------North Distance（m）

"East Dist" ---------East Distance（m）

"South Dist" ---------South Distance（m）

"West Dist" ---------West Distance（m）

"Safe Height" ---------Set Height（m）



Way Point Set

Set four way points (WP1~WP4), allow to turn on/off separately.

Set Custom Mode as Way Point Mode（CH5 > 50% and 30 %< CH6< 70%）. The plane will fly in a loop upon the sequence of 1 to 4, skip the waypoint turned off, and return to home while over the safe time.

"WP safe time" ----------WP safe time.
Returning to home if reachs the safe time. Re-timing only next power-on.

"----------"

"WP1" ---------WP 1 On/Off

"Lng Dist" ---------Waypoint 1 East-West distance away from Home (m)
“>” means East and “<” means West.

"Lat Dist" ---------Waypoint 1 South-North distance away from Home (m)
“≯”means South and“≮”means North

" Height " ---------Waypoint 1 Height（m）

"WP2" ---------WP 2 On/Off

"Lng Dist" ---------Waypoint 2 East-West distance away from Home (m)
“>”means East and “<” means West

"Lat Dist" --------- Waypoint 2 South-North distance away from Home (m)
“≯”means South and “≮” means North

"Height" --------- Waypoint 2 Height（m）

"WP3" ---------WP 3 On/Off

"Lng Dist" --------- Waypoint 3 East-West distance away from Home (m)
“>” means East and “<” means West

"Lat Dist " ---------Waypoint 3 South-North distance away from Home (m)
“≯”means South and “≮” means North

"Height" ---------Waypoint 3 Height(m)

11. Balance Mode and RTH Adjustment (Very Important)

Arkbird's default parameters will be ok for most plane types. But if the most ideal situation expected, please refer to the following methods:

First time installation, do a neutral point alignment. Plane shall be put paralleled to the ground before neutral point check, moving aileron stick left and right to get start. (Refer to CTL menu）

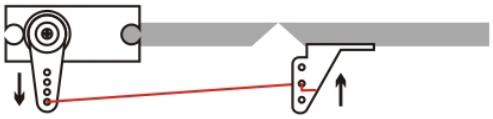
Roll the plane to right and left 45 degree after neutral point check to see if OSD horizon tilts accordingly and quickly.

Please fly on default and record OSD video on the ground. Observe the attitude through OSD and adjust parameters.

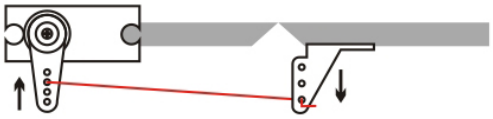
Adjusting Balance Mode:

Purpose: Stick and SUB-TRIM back to center, plane can be able to flight levelly.

1. Please increase control value ("ctl" in CTL menu) or plane's control surface when the stability not good enough (drift even stick back to center), and decrease it when the plane swings.



Increase the travel range of control surface

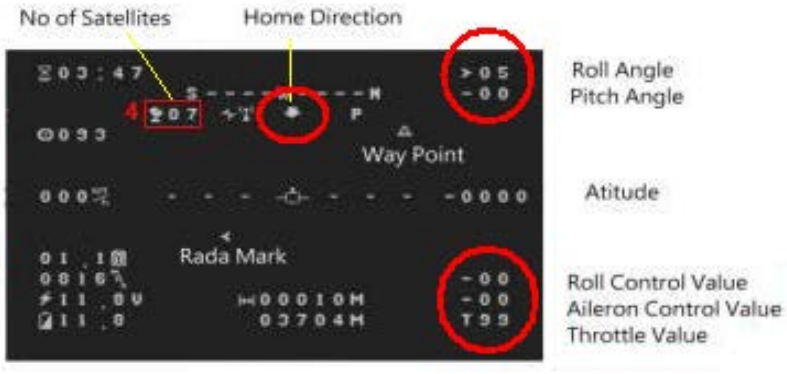


Over compensation
Decrease the travel range of control surface

2. If plane pitches up or down when stick back to center, please adjust the "elevate angle" value (Do not adjust through SUB-TRIM, otherwise RTH Mode won't be precise.)

Adjusting Return to Home Mode:

1. Switch to RTH Mode, Important parameters "Home Direction," "Roll Angle," "Pitch Angle," and "RTH Throttle" shown on OSD shall be checked all the time.
   Flying to certain height, switch to RTH Mode and check if these data are appropriate.



2. Adjust RTH parameters referring to these values. If the roll angle is too small to return promptly, please increase the Max Roll. If the turning is to fast so that the RTH line is "S" sharp, decrease the Max Roll and increase Rudder control (Yaw ctl)
3. Adjust Max Up and Max Down to make plane pitch up and down smoothly. (Too prompt or slow are improper)
4. Based on how far and high expect to fly, adjust safe height as high as possible (If fly far than 2km, please adjust this value more than 150m). Please set cruise speed as "Safe speed" in RTH menu.

12. Frequently Asked Questions:

Q：There is no OSD / OSD is incomplete

A：Check the wiring, restart the power.

Notice that if separated supply, the **sequence to power on** is OSD 12V first, and then ESC flight power. Otherwise, the OSD cannot initialize and display.

If there shows OSD but incomplete, check PAL/ NTSC signal custom option or change display device, some USB-AV card output is incomplete

Q： OSD disappear once plugged the camera

A： Change PAL/ NTSC option, use mainstream FPV specialized camera, some surveillance camera is compatible.

Q： Can not locate home, displaying "Waiting GPS Home"

A： Seeing OSD "Waiting GPS Home" proves GPS wiring is OK, otherwise, please check GPS wiring.

GPS's white antenna shall face up; keep GPS away from Video TX and Camera. Some

inferior Video TX's antenna will affect GPS, too.

GPS can only work Outdoors, First time about 5-10 minutes, next power on of the same day it would take less than 10seconds to locate.

Q： Plane tilts under Balance Mode / Manual Mode, can I adjust the radio TRIM

A： First time installation, do a neutral point alignment. Radio stick and SUB-TRIM back to center, adjust plane's CG and travel angle to make plane balanced.

Arkbird can produce compensation when CG & travel angle is not appropriate, but it is not mechanical stable, there would be hidden trouble under RTH mode. So firstly make sure plane can fly stably in horizontal under Manual Mode.

Attention:

Please read through carefully:

1. The design purpose of autopilot is to keep balance of flight, it is not able to manipulate plane or prevent stall.
You must have sufficient experiences of fixed wing to control the flight.
2. The autopilot is only for small-scale RC model. For safety concern, please do not install in plane for aerial photography which might fly over crowd.
3. Please install the autopilot depends on your demands and check the condition before flying every time.
4. Any equipments and electric products on the plane couldn't be completely reliable, please using this system following the instruction. The system provider is not responsible for any direct or indirect loss and consequence caused by using this product.